

I claim:

1 1. A versatile modular water purification system including:

2 a) a frame structure for joining and supporting, in side-by-side relation, a  
3 plurality of chamber-defining canisters serially in a path of water flow though the  
4 system,

5 b) an irradiation canister supported on the frame structure, said irradiation  
6 canister defining an irradiation chamber having an ultraviolet light (UV), ozone  
7 treatment and oxygenation location extending along its length, and

8 c) at least one of a pre-filtration and post-filtration filtering canister supported  
9 on the frame structure located at at least one of an upstream and a downstream  
10 location with respect to the irradiation canister, said filtering canister defining a  
11 chamber and having a filter location therein for locating a filter in sealed, non-  
12 bypass filtering relation to the flow of water therethrough.

1 2. The versatile modular water purification system according to claim 1, wherein each  
2 of said canisters has a substantially identically molded exterior, each interfitting with the  
3 frame structure in like manner.

1 3. The versatile modular water purification system according to claim 1, the at least  
2 one of a pre-filtration and post-filtration filtering canister including a pre-filtration filtering  
3 canister at an upstream location with respect to the irradiation canister, the pre-filtration  
4 filtering canister having a pre-filtration filter effective to clarify water moving to the  
5 irradiation chamber to thereby substantially eliminate UV irradiation blockage by  
6 particulates in the water to be irradiated.

1 4. The versatile modular water purification system according to claim 3, wherein the  
2 at least one of a pre-filtration and post-filtration filtering canister includes a post-filtration  
3 filtering canister supported downstream of the irradiation canister on the frame structure  
4 and having a chamber housing, in sealed, non-bypass filtering relation to the flow of water  
5 therethrough, a filter finer than the pre-filtration filter.

1    5.     The versatile modular water purification system according to claim 4, wherein the  
2     irradiation chamber is an elongate chamber housing an elongate UV lamp extending from  
3     one end of the irradiation chamber to another end of the irradiation chamber along the  
4     length of the chamber, the UV lamp being exposed along the entirety of its length within  
5     the irradiation chamber to irradiate all of the water moving through the irradiation chamber  
6     at any given time from an inlet at one end of the irradiation chamber to an outlet at another  
7     end of the irradiation chamber.

1    6.     The versatile modular water purification system according to claim 2, wherein each  
2     canister has an elongated cylindrical wall integrally molded to an end cap, the end cap  
3     defining a water input port communicating with a swirl producing channel, the port and the  
4     channel being integrally molded into the end cap.

1    7.     The versatile modular water purification system according to claim 6, wherein the  
2     end cap has a generally centrally located bore leading into the interior of the chamber, said  
3     bore having integrally molded generally radially extending lugs for securing a UV lamp in  
4     place within the chamber.

1    8.     A water purification system having a plurality of chambers connected serially in a  
2     path of water flow through the system, including an irradiation chamber having an  
3     ultraviolet light (UV), ozone treatment and oxygenation location extending along its length  
4     and free of filters, and at least one filter chamber, the UV, ozone and oxygenation  
5     treatment location comprising an elongate UV lamp extending along the length of the  
6     irradiation chamber to irradiate water moving in the chamber from a water inlet at one end  
7     of the irradiation chamber to a water outlet at a further end of the irradiation chamber, the  
8     at least one filter chamber having a water inlet at one end, a water outlet at another end and  
9     a filter location intermediate the water inlet and the water outlet in the path of water flow  
10    for locating a filter in non-bypass relation to the flow of water from the water inlet to the  
11    water outlet.

1   9.     The water purification system according to claim 8, wherein the at least one filter  
2   chamber is a chamber that is upstream of the irradiation chamber, a water connection from  
3   the water outlet of the at least one filter chamber to the water inlet of the irradiation  
4   chamber, and the system including at least one further filter chamber downstream of the  
5   irradiation chamber, the at least one further filter chamber having a water inlet at one end  
6   and a water outlet at the other end, a water connection from the water outlet of the  
7   irradiation chamber to the water inlet of the at least one further filter chamber and a further  
8   filter location intermediate the water inlet and the water outlet of the at least one further  
9   chamber.

1   10.   The water purification system according to claim 8, wherein the filter chamber that  
2   is upstream of the irradiation chamber contains a pre-filtration filter effective to clarify  
3   water moving to the irradiation chamber to thereby substantially eliminate UV irradiation  
4   blockage by particulates in the water to be irradiated.

1   11.   The water purification system according to claim 10, wherein the pre-filtration  
2   filter is adapted to remove over 90% of particulates greater in size than 5 microns.

1   12.   The water purification system according to claim 9, wherein the upstream chamber  
2   contains a pre-filtration filter effective to clarify water moving to the irradiation chamber  
3   to thereby substantially eliminate UV irradiation blockage by particulates in the water to be  
4   irradiated, and the at least one further filter chamber contains a post-filtration filter finer  
5   than the pre-filtration filter.

1   13.   The water purification system according to claim 12, wherein the post-filtration  
2   filter is adapted to remove over 90% of particulates larger than about one micron to filter  
3   out materials of the group consisting of dead bacteria, heavy metals, cysts, viruses,  
4   chlorine, lead, carbon, heavy metals and trihalomethanes.

1    14.    The water purification system according to claim 13, wherein the post-filtration  
2    filter is a carbon block filter, and ozone treatment in the irradiation chamber is effective to  
3    substantially reduce or eliminate live bacteria in the flow of water to the carbon block filter  
4    to substantially reduce or eliminate breeding of bacteria at the carbon filter.

1    15.    The water purification system according to claim 8, wherein both the irradiation  
2    chamber and the at least one filter chamber are formed in canisters having side walls and  
3    one end integrally molded, a closure at a further end detachably secured to the side walls,  
4    each end of the at least one filter chamber canister having a knife edge seal engaging an  
5    end of a contained cylindrical filter extending along the length of the chamber, each of the  
6    water inlet and water outlet of the at least one filter chamber opening to one of an exterior  
7    and an interior of the cylindrical filter so that water flows through the filter from the inlet  
8    to the outlet.

1    16.    A method of water purification comprising:

2        a)      directing a flow of water through a plurality of serially connected chambers,

3        b)      providing a first, filtration chamber,

4        c)      locating a first filter in the first chamber in non-bypass relation to the flow  
5                  of water therethrough, to provide filtration in the first chamber of all of the  
6                  water flowing through the chamber,

7        d)      providing a second, irradiation chamber,

8        e)      directing the flow of water from the first chamber through the second  
9                  chamber,

10      f)      irradiating the flow of water through the second chamber with ultraviolet  
11                  light (UV),

12      g)      generating ozone in the second chamber,

13      h)      introducing the ozone generated in the second chamber into the flow of  
14                  water through the second chamber, and

15      i)      clarifying the water flowing through the first chamber by removing  
16                  particulates in the first chamber to substantially prevent particulates interfering  
17                  with UV irradiation of water flow through the second chamber.

1    17.    The method of water purification according to claim 16, wherein the step of  
2      clarifying includes removing by filtration substantially all particulates greater in size than 5  
3      microns.

1    18.    The method of water purification according to claim 17, wherein the step of  
2      clarifying includes removing by filtration more than 90% of particulates greater in size  
3      than 5 microns.

1    19.    The method of water purification according to claim 16, wherein the step of  
2    locating a first filter in the first chamber includes locating a generally hollow cylindrical  
3    filter, with an interior and an exterior, lengthwise in the first chamber and sealing the filter  
4    at its ends at the top and bottom of the chamber to prevent water flow between the exterior  
5    and the interior of the filter other than through the filter, and the step of directing a flow of  
6    water through the plurality of serially connected chambers includes directing the flow of  
7    water into the first chamber to one of the exterior and interior of the hollow cylindrical  
8    filter therein and directing the flow of water out of the second chamber from the other of  
9    the exterior and interior of the hollow cylindrical filter therein.

1    20.    The method of water purification according to claim 19, wherein the step of  
2    irradiating comprises locating an elongate lamp in the second chamber extending from one  
3    end of the second chamber to the other end of the second chamber and directing ultraviolet  
4    light from the lamp to the flow of water through the chamber along the entire length of the  
5    lamp within the chamber.

1    21.    The method of water purification according to claim 20, further comprising:  
2        j)    providing a further filtration chamber in the path of water flow downstream  
3              of the second chamber, including locating within the further filtration  
4              chamber, in the path of water flow therethrough, a finer filter than that  
5              located in the first filter.

1    22.    The method of water purification according to claim 21, wherein locating within  
2    the further filtration chamber a finer filter includes locating a generally hollow cylindrical  
3    filter, with an interior and an exterior, lengthwise in the further chamber and sealing the  
4    filter at its ends at the top and bottom of the chamber to prevent water flow between the  
5    exterior and the interior of the filter other than through the filter, and the step of directing a  
6    flow of water through the plurality of serially connected chambers includes directing the  
7    flow of water into the first chamber to one of the exterior and interior of the hollow  
8    cylindrical filter therein and directing the flow of water out of the chamber from the other  
9    of the exterior and interior of the hollow cylindrical filter therein.

1 23. A method of water purification comprising:

2       a) directing a flow of water through a plurality of serially connected chambers,

3       b) providing an irradiation chamber,

4       c) irradiating the flow of water through the irradiation chamber with

5       ultraviolet light (UV),

6       d) generating ozone in the irradiation chamber,

7       e) introducing the ozone generated in the irradiation chamber into the flow of

8       water through the irradiation chamber,

9       f) providing a second, filter chamber,

10      g) directing the flow of water from the first chamber through the second

11      chamber, and

12      h) locating a filter in the second, filter chamber in non-bypass relation to the

13      flow of water therethrough, to provide filtration in the second, filter chamber of all

14      of the water flowing through the chamber,

15      the step of irradiating comprising exposing the flow of water through the irradiation

16      chamber to UV, ozone and oxygenation to effectively kill bacteria in the flow of water,

17      whereby bacteria breeding on the filter in the second filter chamber is substantially

18      prevented.

1 24. The method of water purification according to claim 23, wherein the step of

2      locating a filter includes locating a generally hollow cylindrical filter, with an interior and

3      an exterior, lengthwise in the second, filter chamber and sealing the filter at its ends at the

4      top and bottom of the chamber to prevent water flow between the exterior and the interior

5      of the filter other than through the filter, and the step of directing a flow of water through

6      the plurality of serially connected chambers includes directing the flow of water into the

7      second, filter chamber to one of the exterior and interior of the hollow cylindrical filter

8 therein and directing the flow of water out of the second chamber from the other of the  
9 exterior and interior of the hollow cylindrical filter therein.

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1       25. The method of water purification according to claim 23, wherein the step of  
2 irradiating comprises locating an elongate lamp in the irradiation chamber extending from  
3 one end of the irradiation chamber to the other end of the irradiation chamber and directing  
4 ultraviolet light from the lamp to the flow of water through the irradiation chamber along  
5 the entire length of the lamp within the irradiation chamber to all of the water moving  
6 through the irradiation chamber.

1       26. The method according to claim 25, further comprising:

2           i) clarifying the flow of water in a pre-filter filtration chamber before  
3 introducing the flow of water into the irradiation chamber.

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